

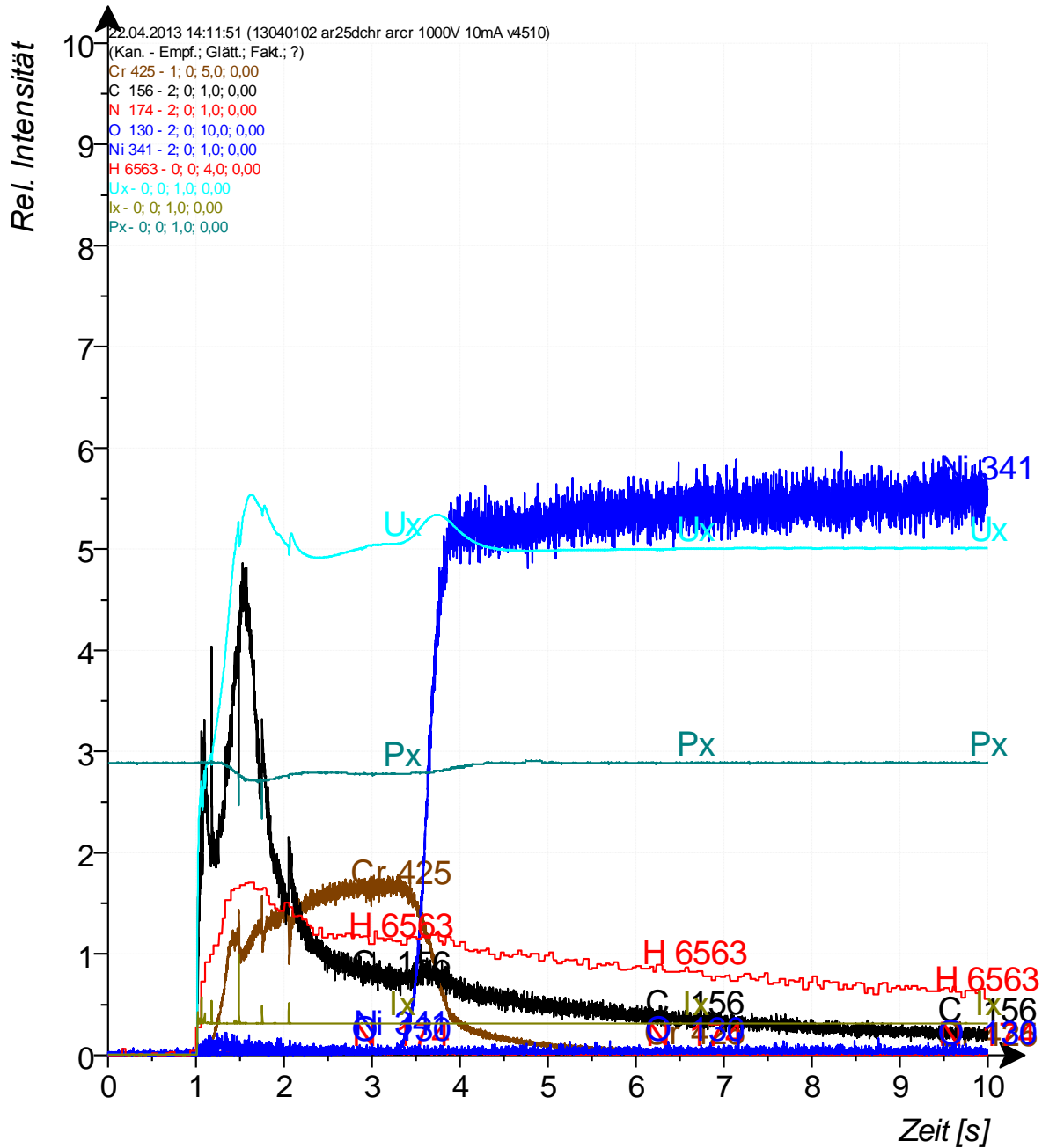
# Grundlagen zur GDOES- Tiefenprofilanalytik von Nanoschichten

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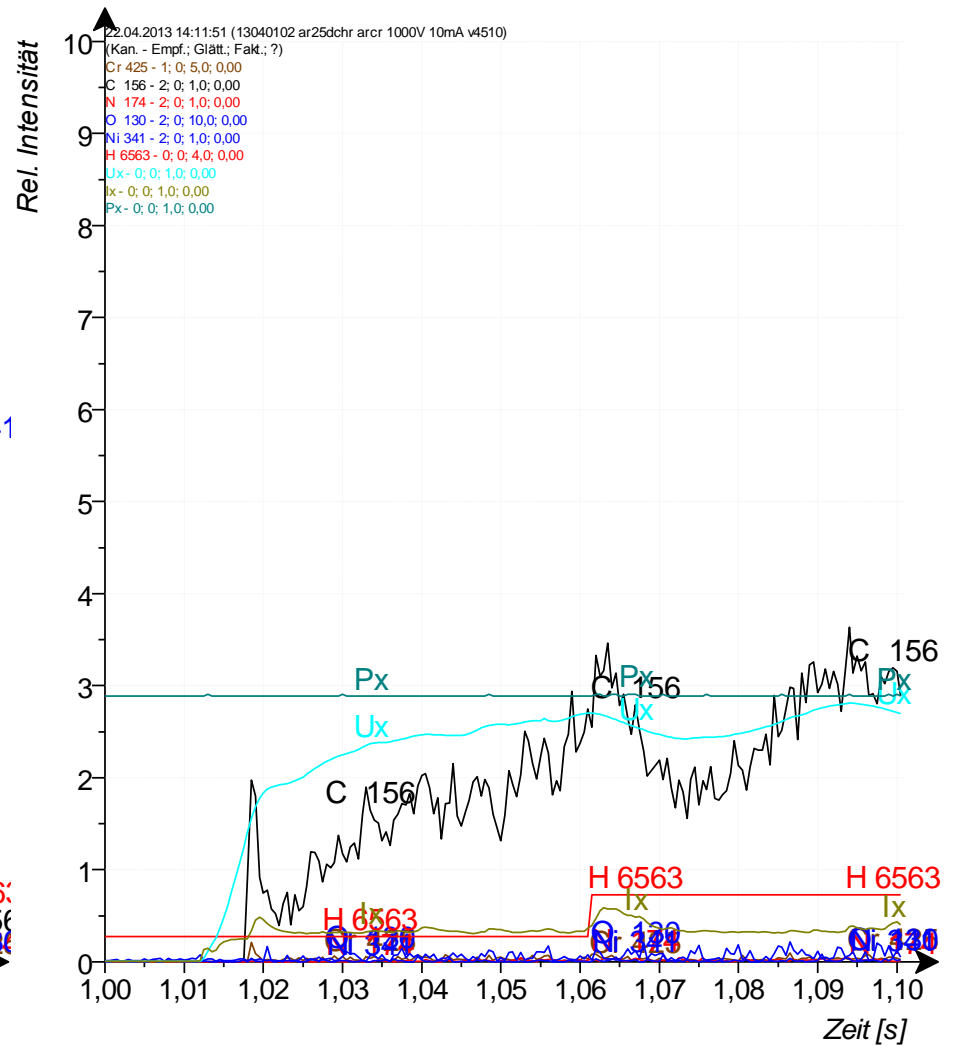
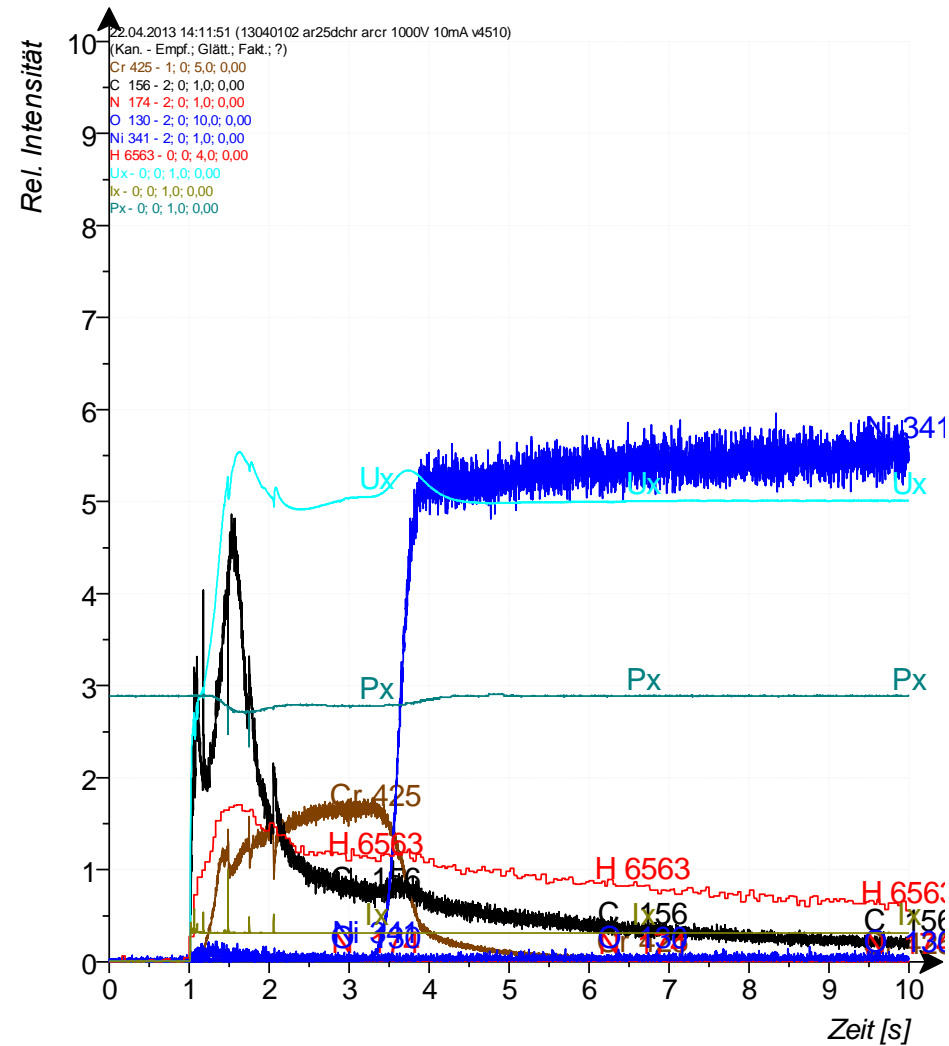
# Übersicht

1. Starteigenschaften „normaler“ Glimmentladungsplasmen
2. Probleme hoher Sputterraten
3. Plasmen mit geringe Sputterleistung
4. Anregung durch Plasmen niedriger Sputterleistung
5. Ergebnisse

# 1. Starteigenschaften „normaler“ Glimmentladungsplasmen



## 2. Probleme hoher Sputterraten / kurzer Sputterzeiten



Chromschicht mit ~200 nm Dicke, gemessen mit typischen DC-Bedingungen

### 3. Plasmen mit geringer Sputterleistung

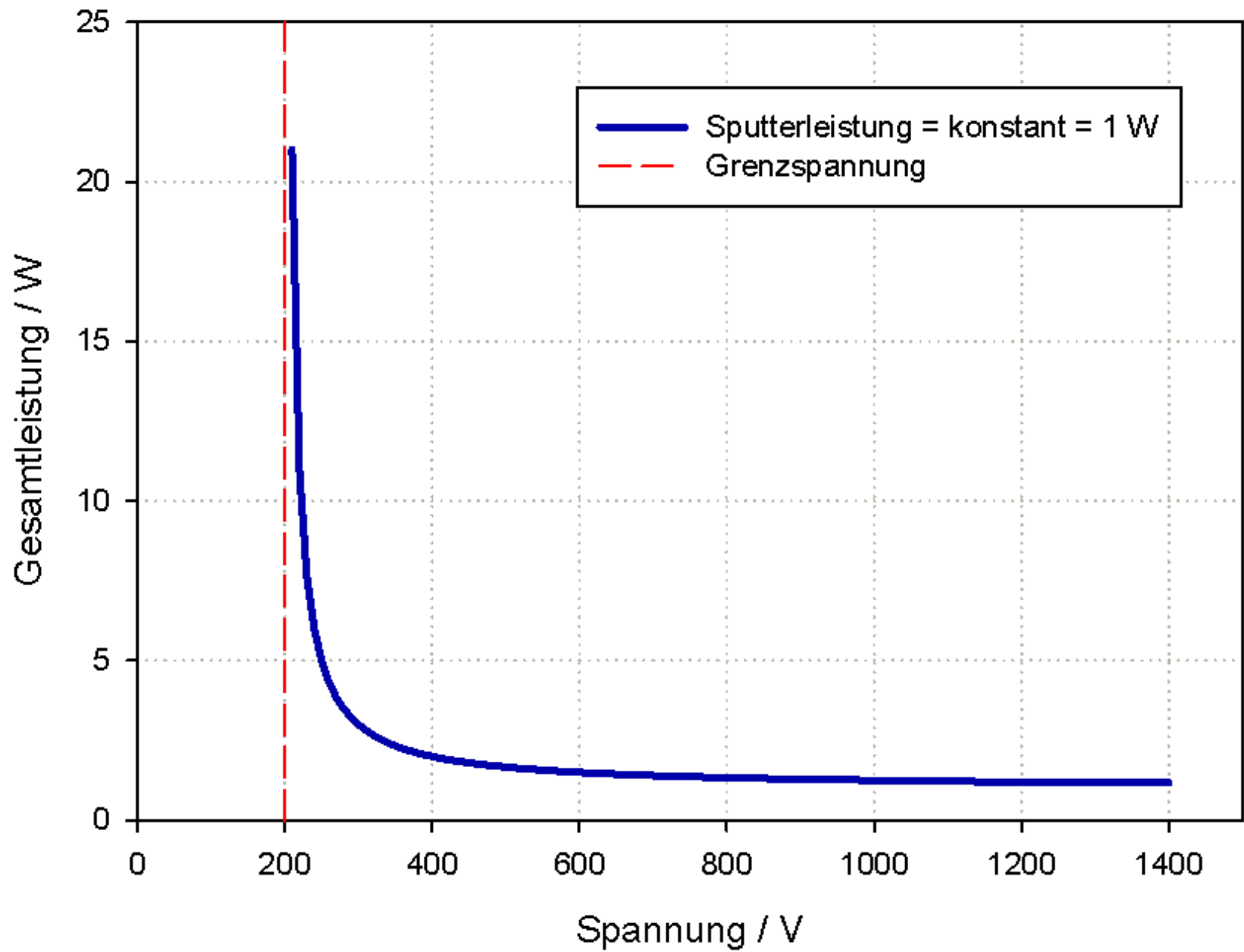
Spezifische Sputterkonstante Fe: 0,24 µg/Ws

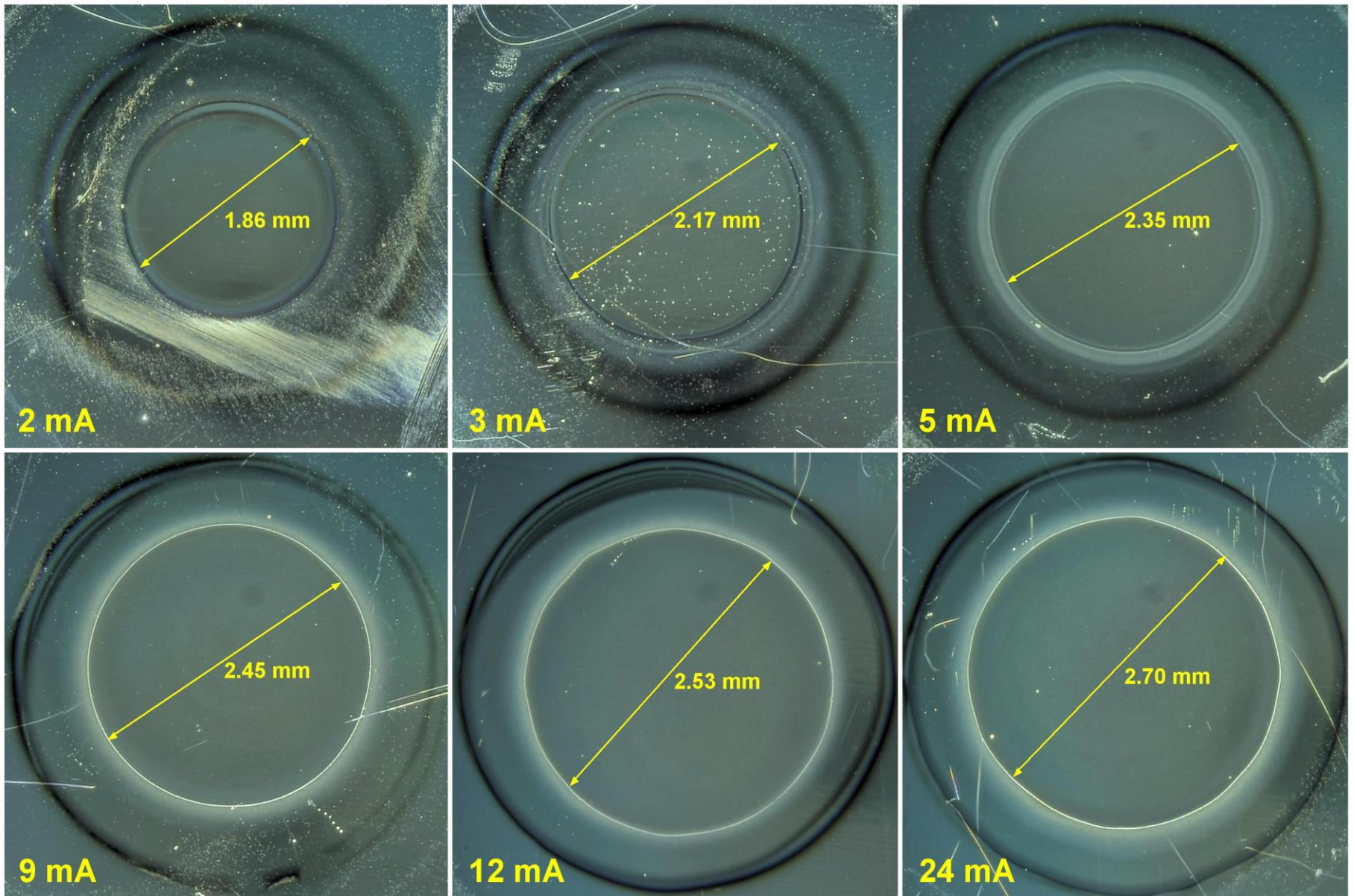
$$W_{\text{Zerstäubung}} = (U - U_0) \cdot I \cdot t$$

$$P_{\text{Zerstäubung}} = (U - U_0) \cdot I$$

$$P_{\text{Gesamt}} = U \cdot I$$

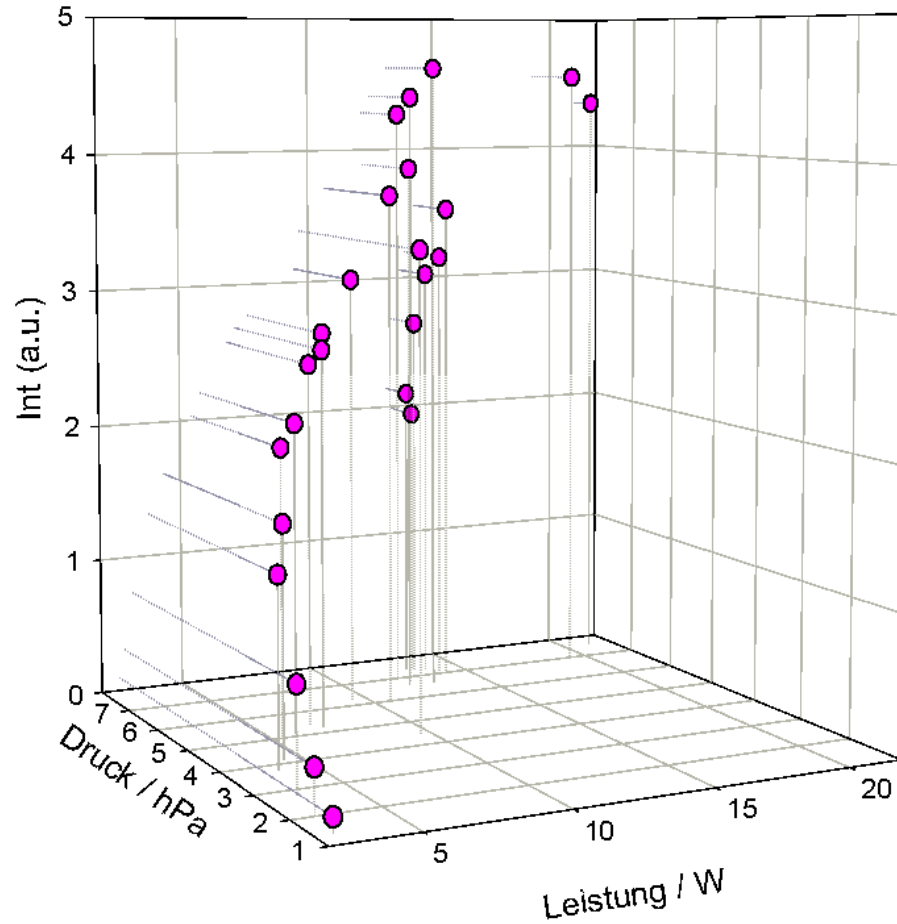




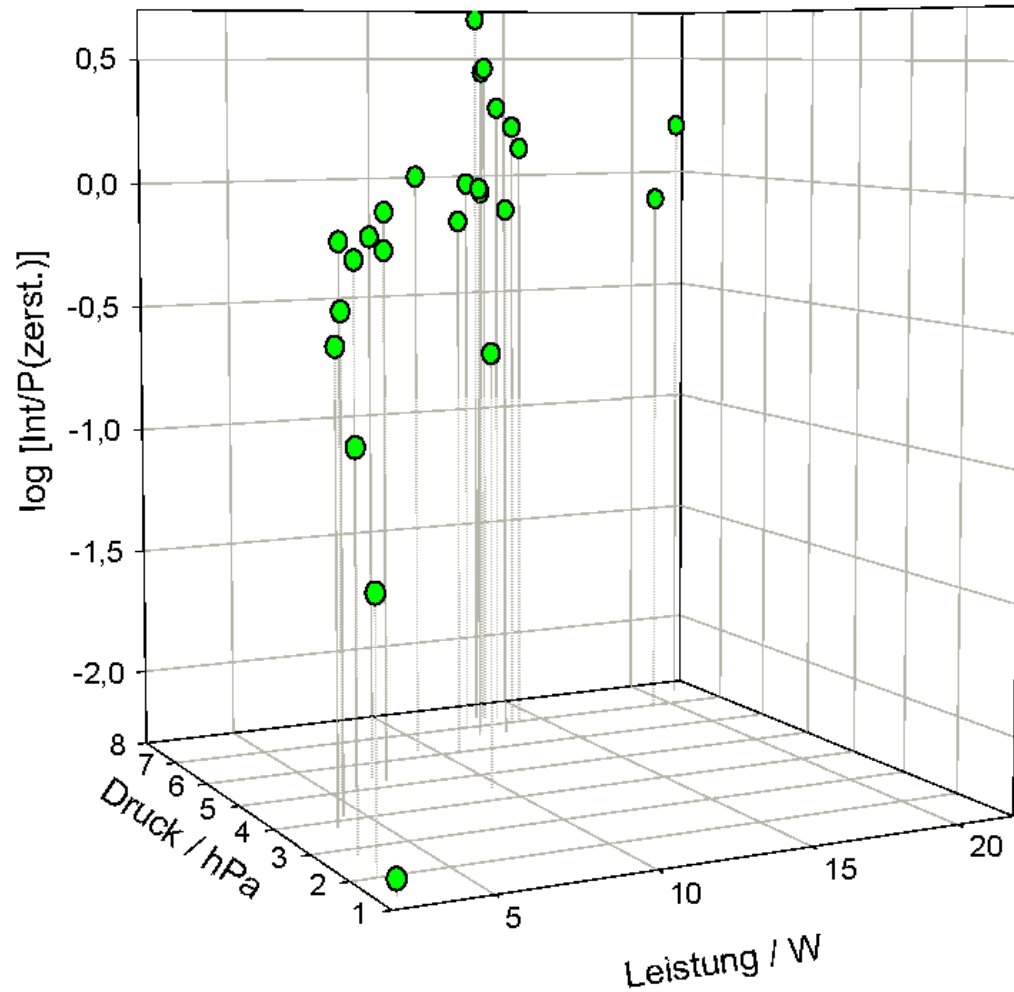


Kraterdurchmesser in Abhängigkeit von der Stromstärke

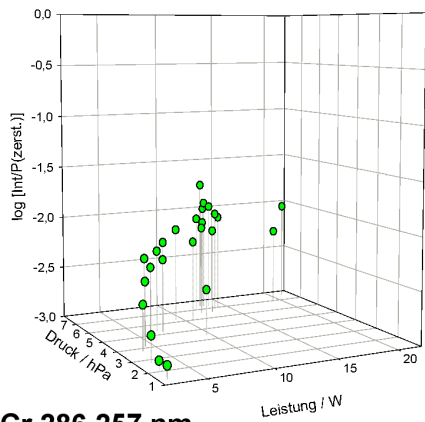
## 4. Anregung durch Plasmen mit niedriger Sputterleistung



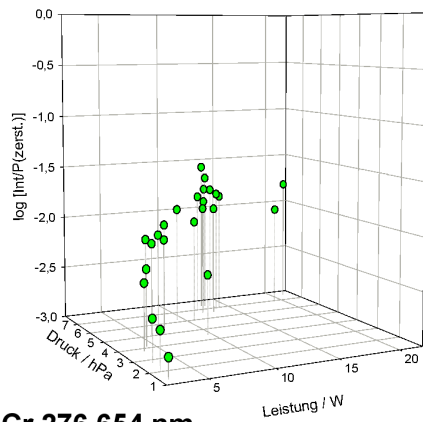
Intensität der Argonlinie 706 nm in Abhängigkeit von Druck und Gesamtleistung



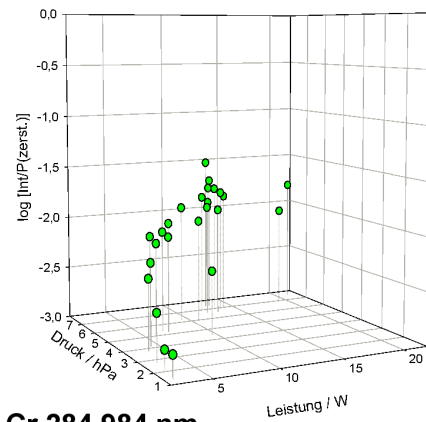
Emmisionsrate der Chromlinie 425 nm in Abhängigkeit von Druck und Gesamtleistung



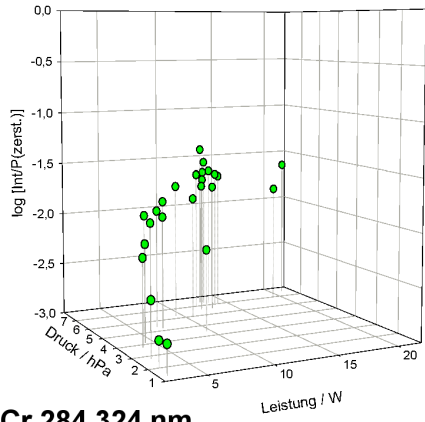
**Cr 286.257 nm**



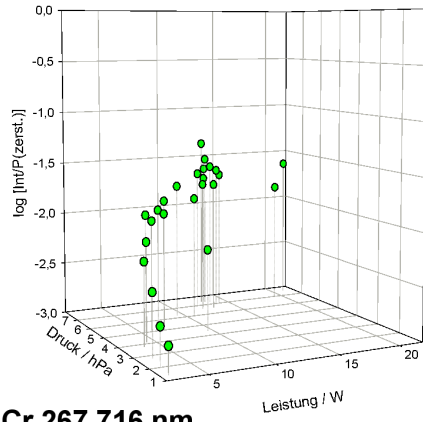
**Cr 276.654 nm**



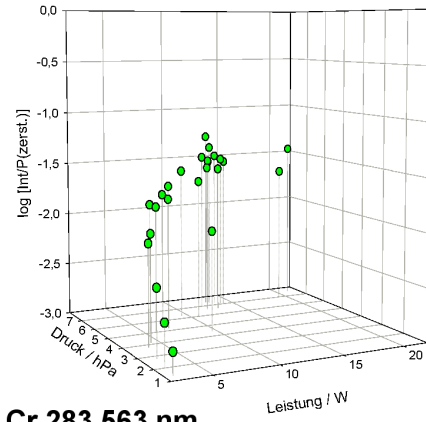
**Cr 284.984 nm**



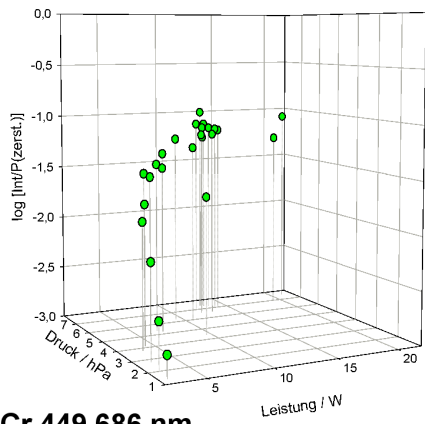
**Cr 284.324 nm**



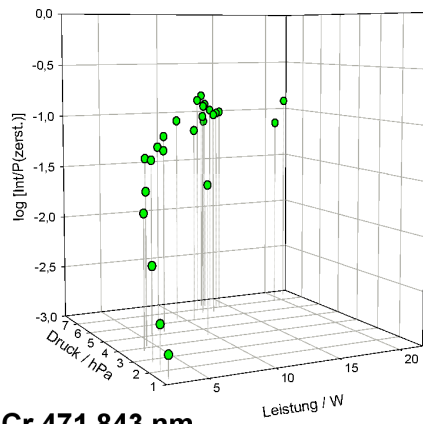
**Cr 267.716 nm**



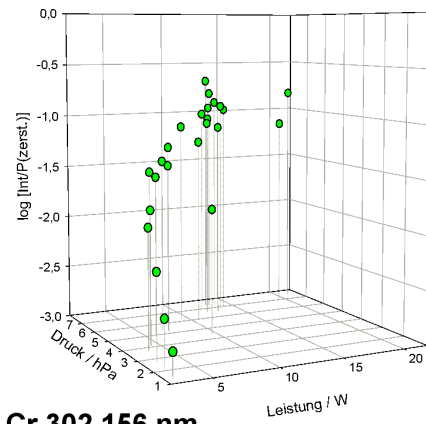
**Cr 283.563 nm**



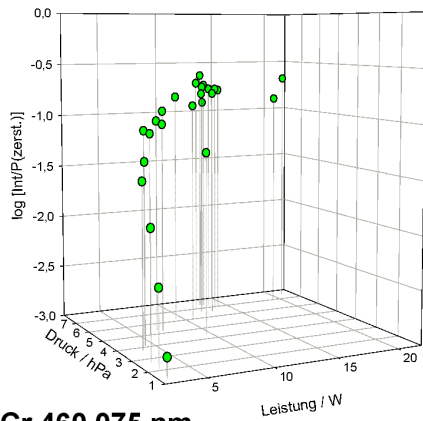
**Cr 449.686 nm**



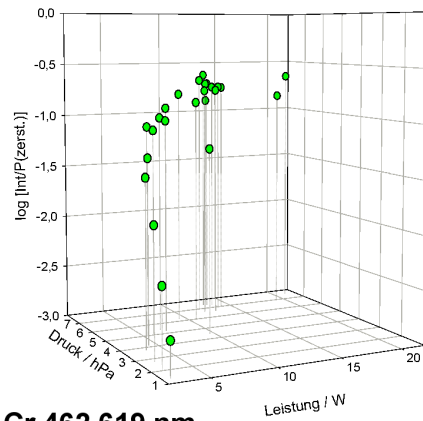
**Cr 471.843 nm**



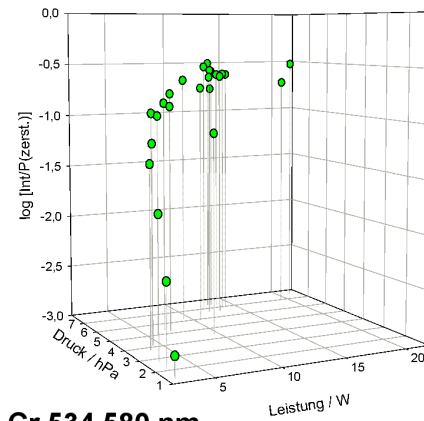
**Cr 302.156 nm**



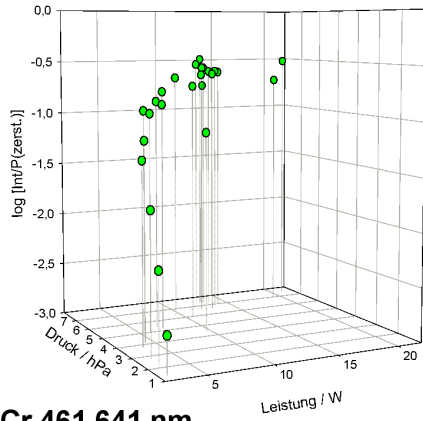
**Cr 460.075 nm**



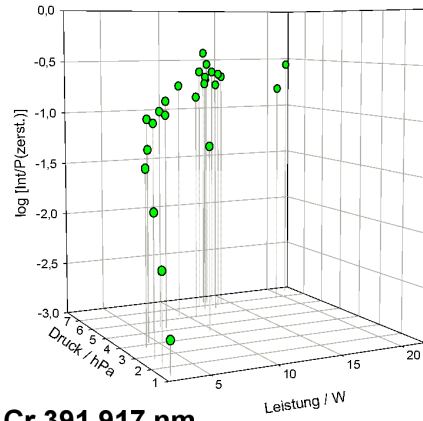
**Cr 462.619 nm**



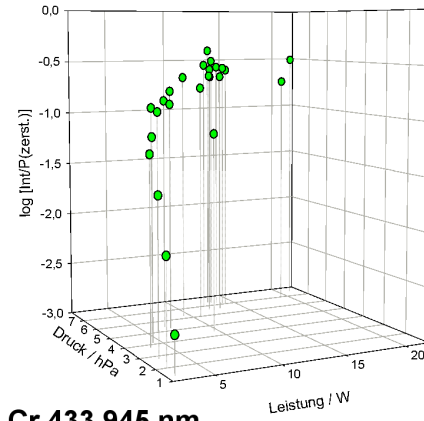
**Cr 534.580 nm**



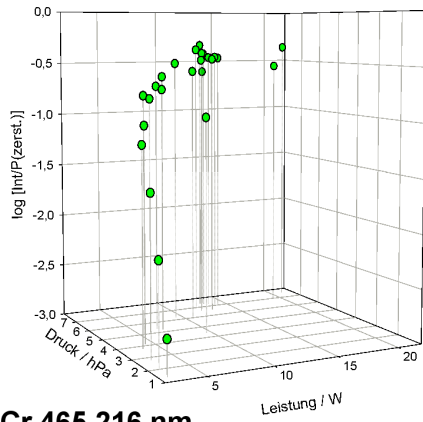
**Cr 461.641 nm**



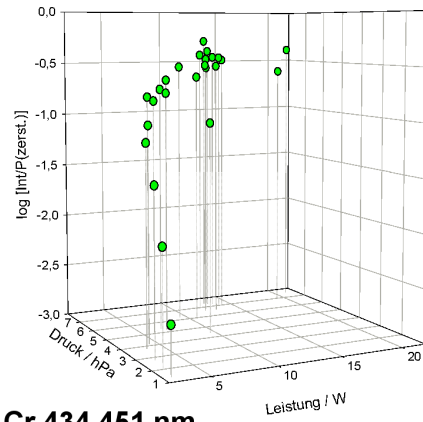
**Cr 391.917 nm**



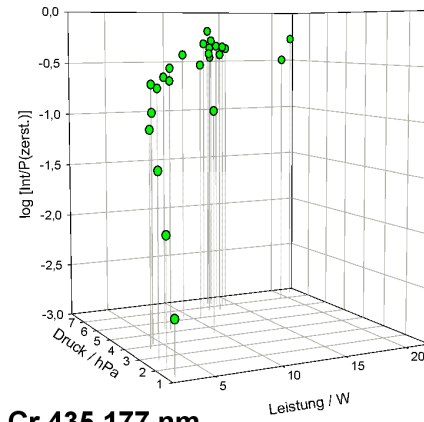
**Cr 433.945 nm**



**Cr 465.216 nm**

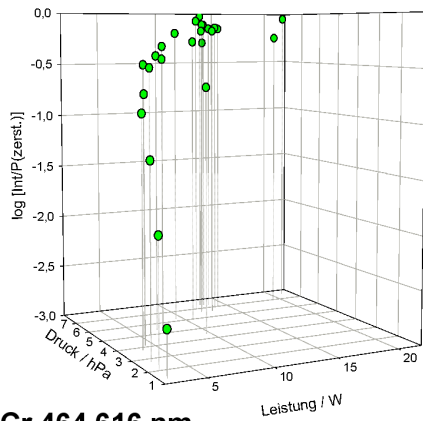


**Cr 434.451 nm**

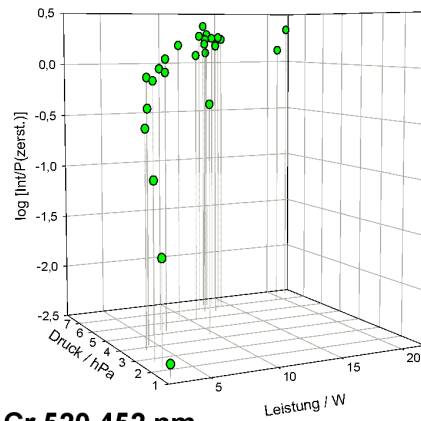


**Cr 435.177 nm**

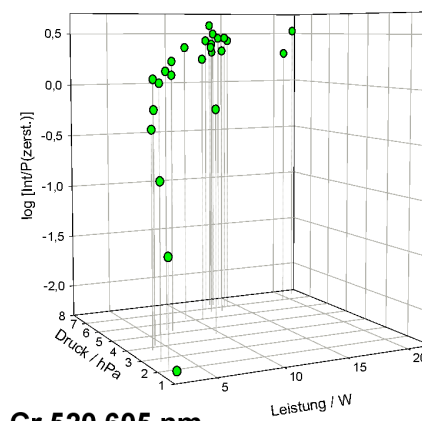




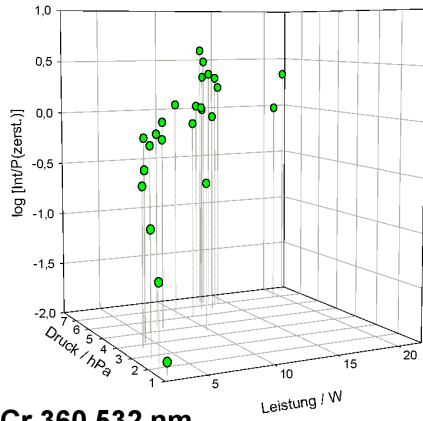
**Cr 464.616 nm**



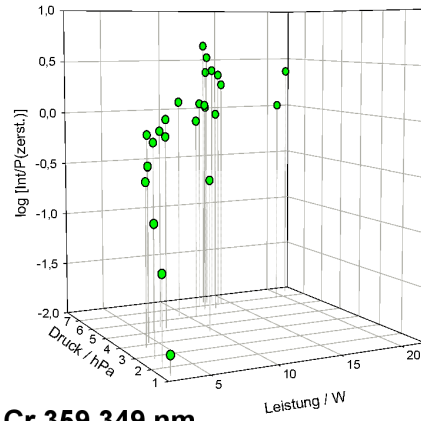
**Cr 520.452 nm**



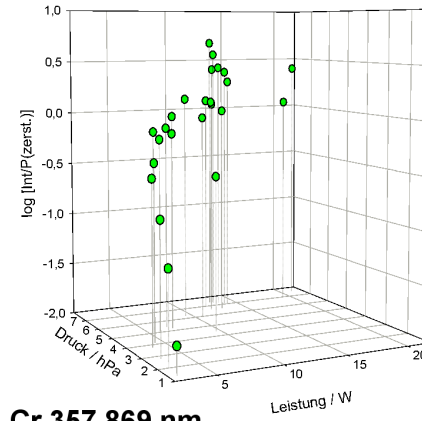
**Cr 520.605 nm**



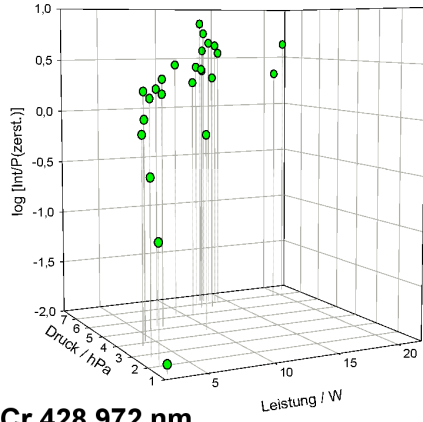
**Cr 360.532 nm**



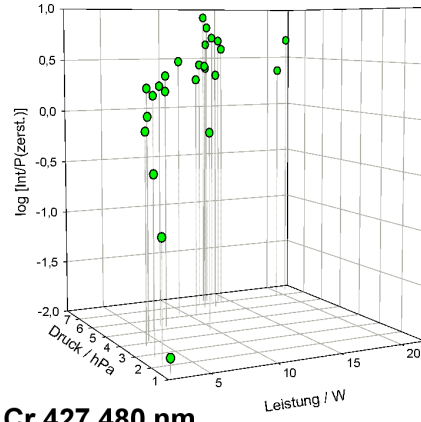
**Cr 359.349 nm**



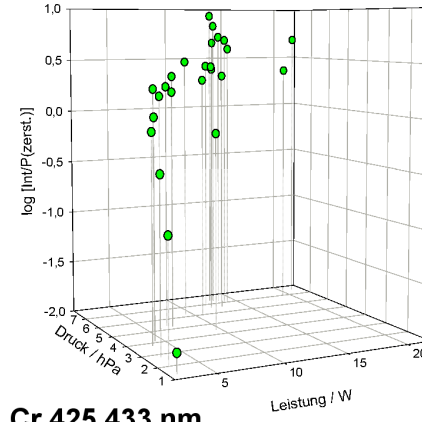
**Cr 357.869 nm**



**Cr 428.972 nm**

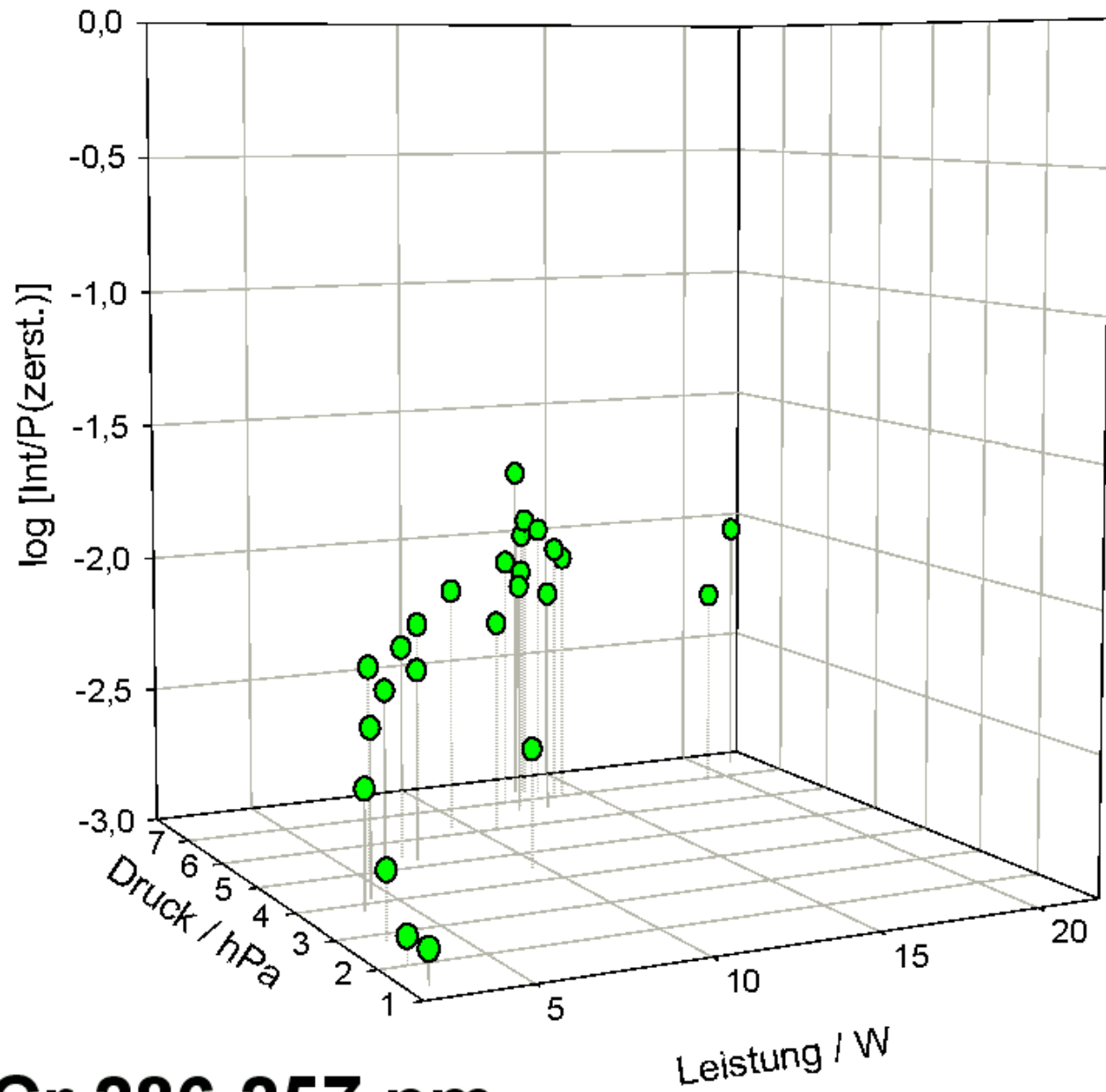


**Cr 427.480 nm**



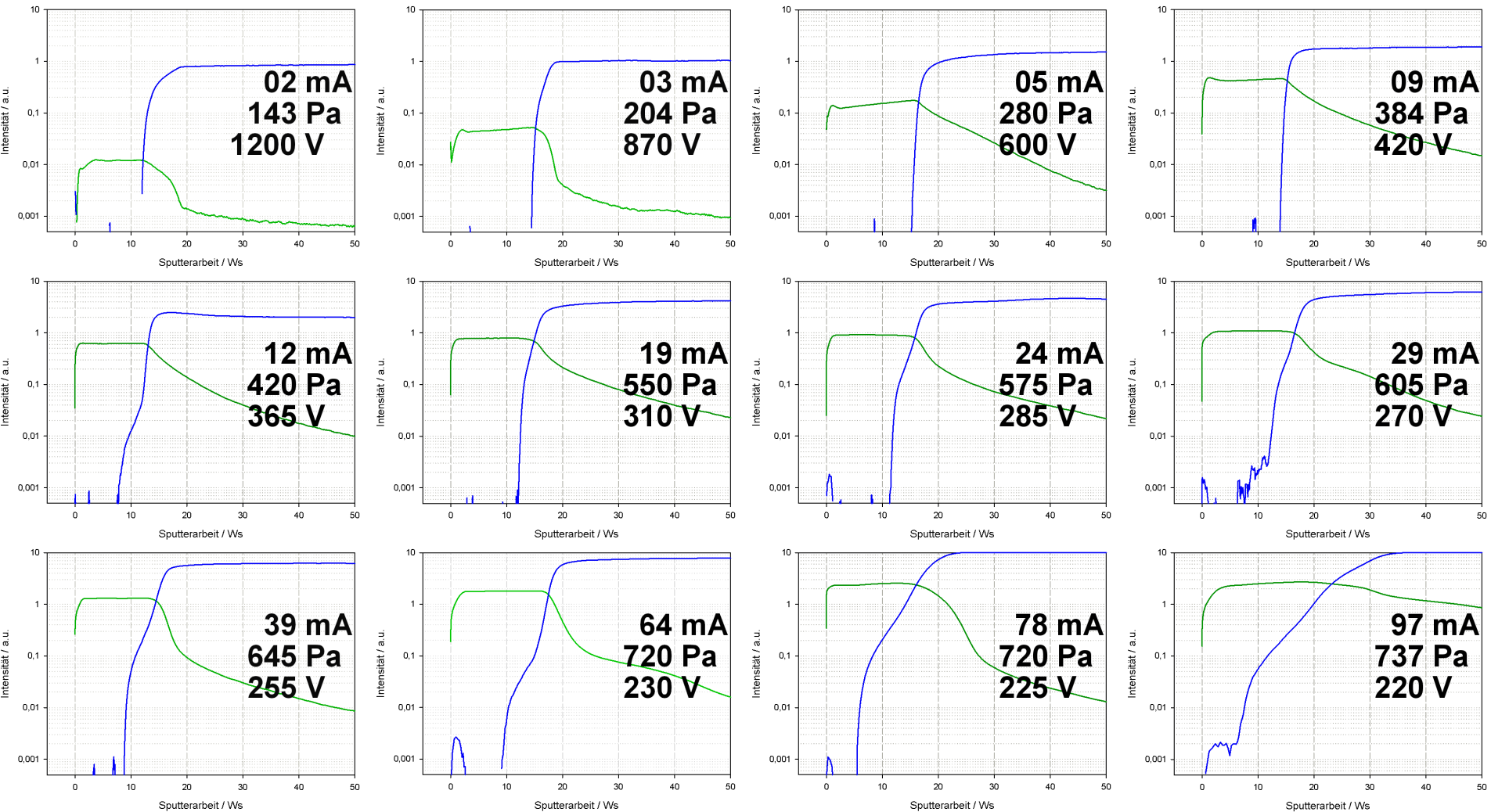
**Cr 425.433 nm**



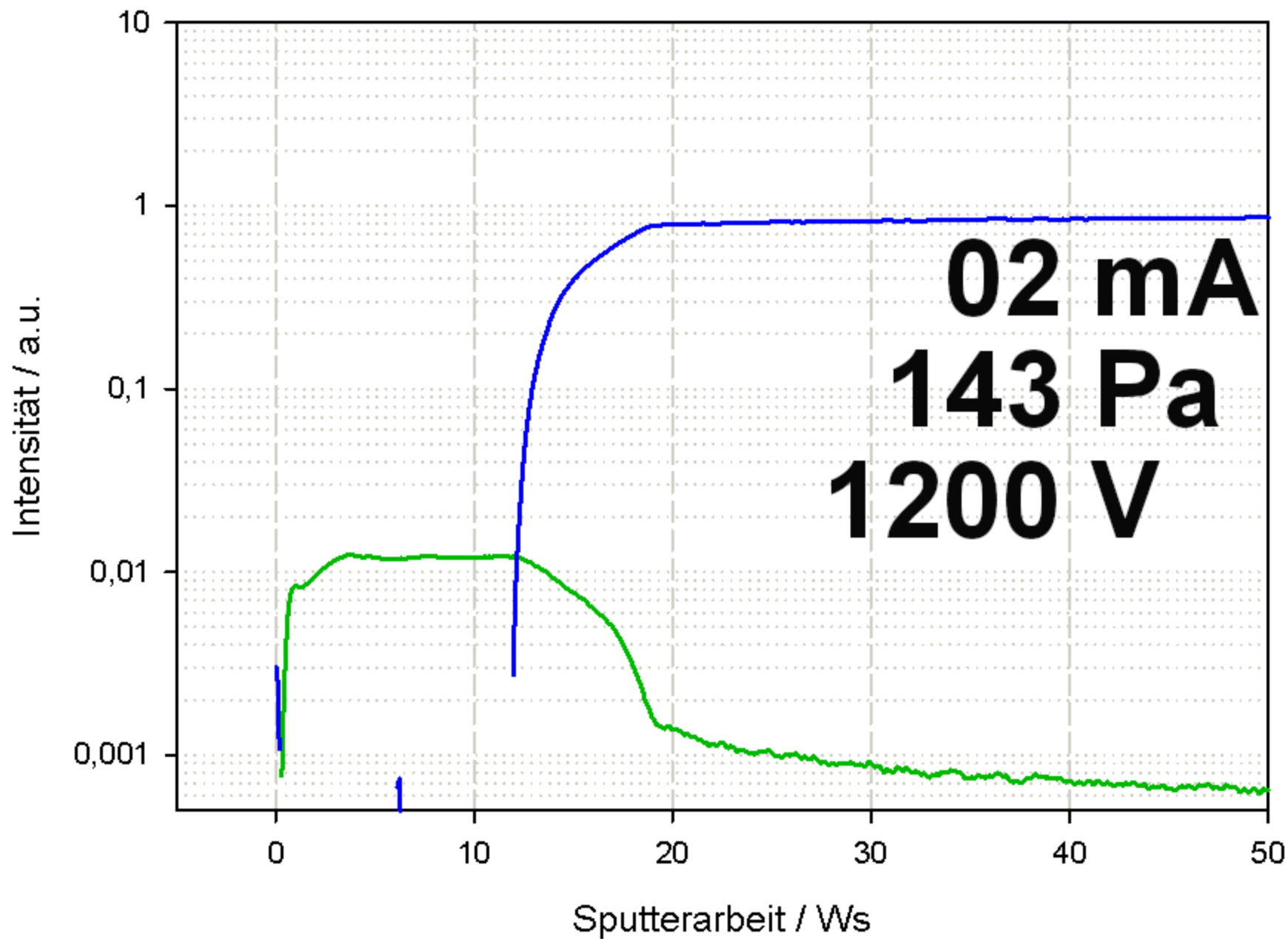


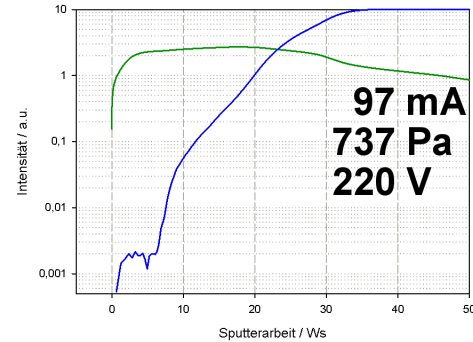
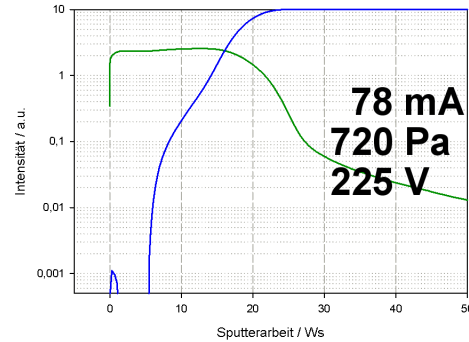
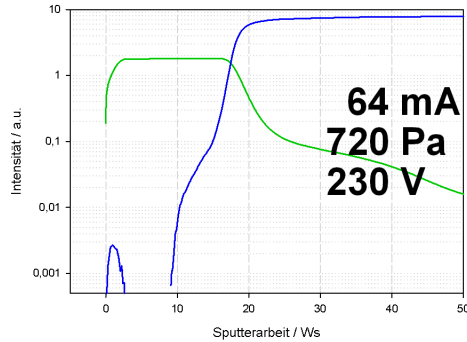
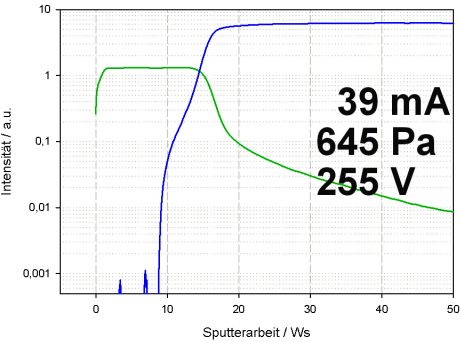
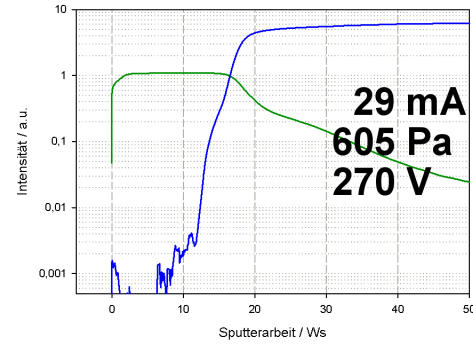
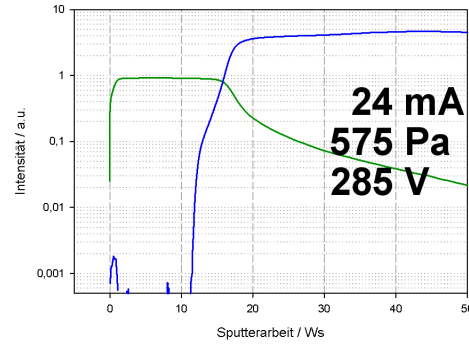
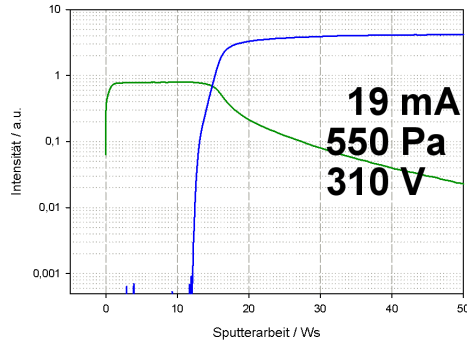
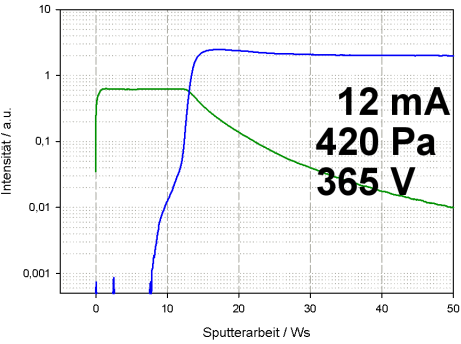
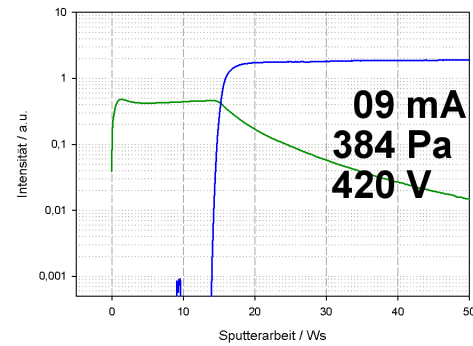
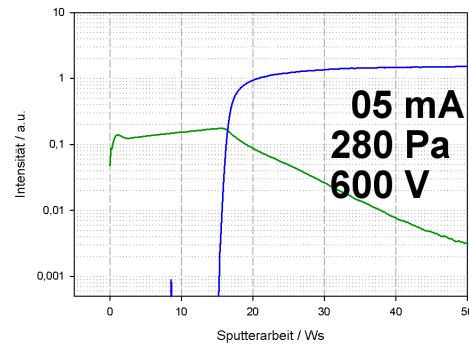
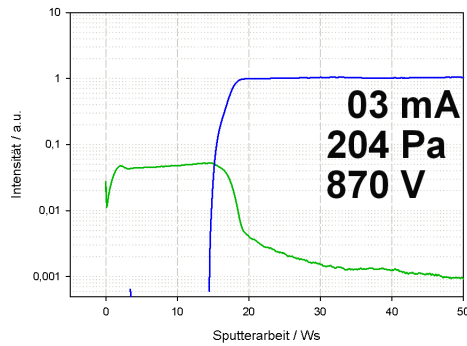
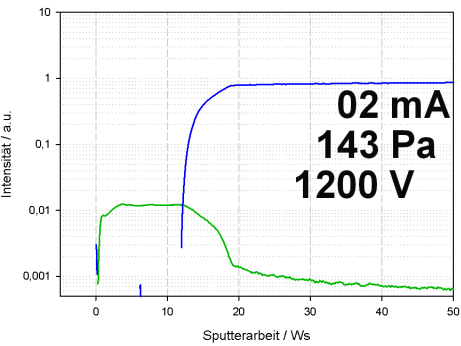
# Cr 286.257 nm

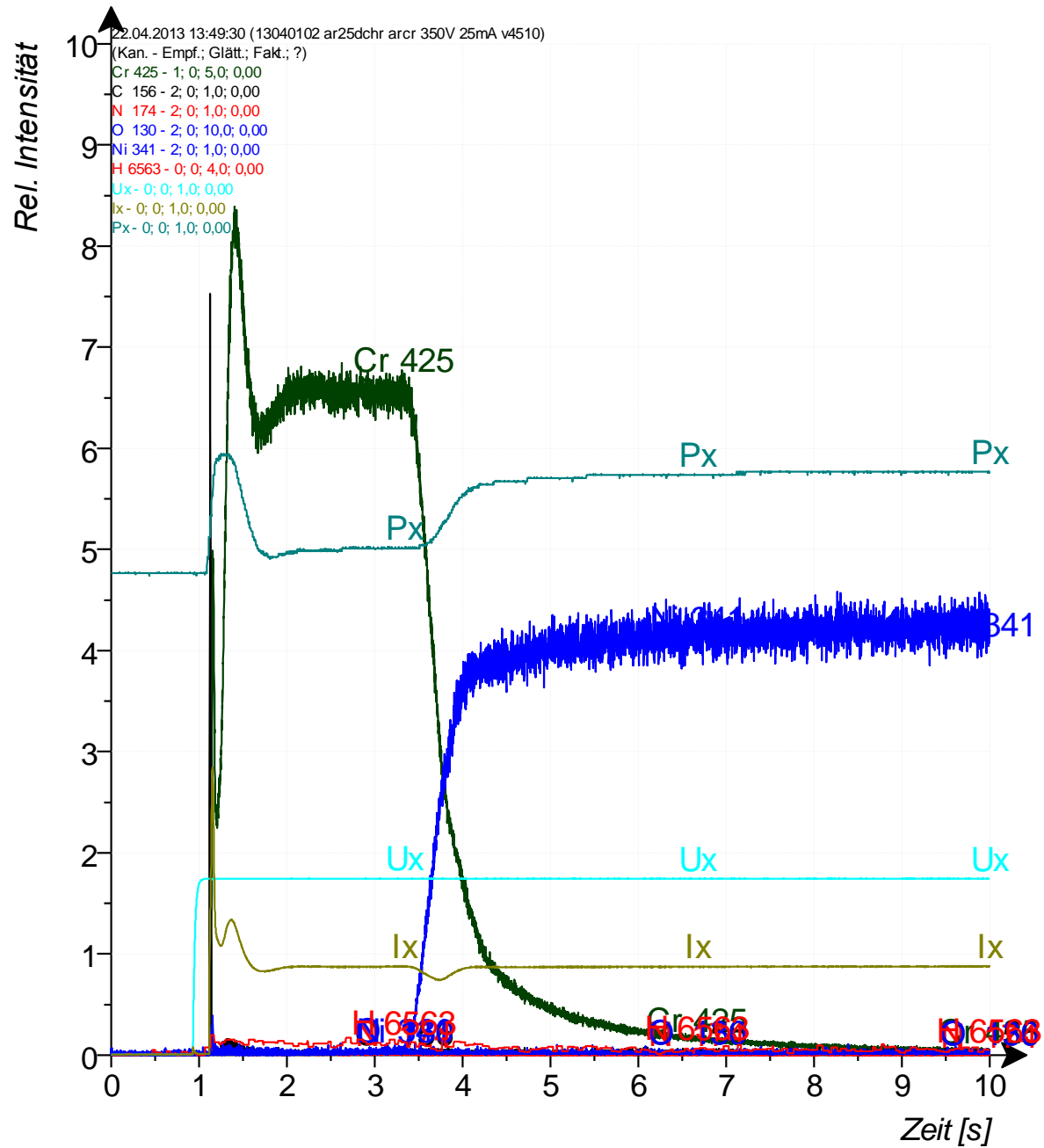
# 5. Ergebnisse

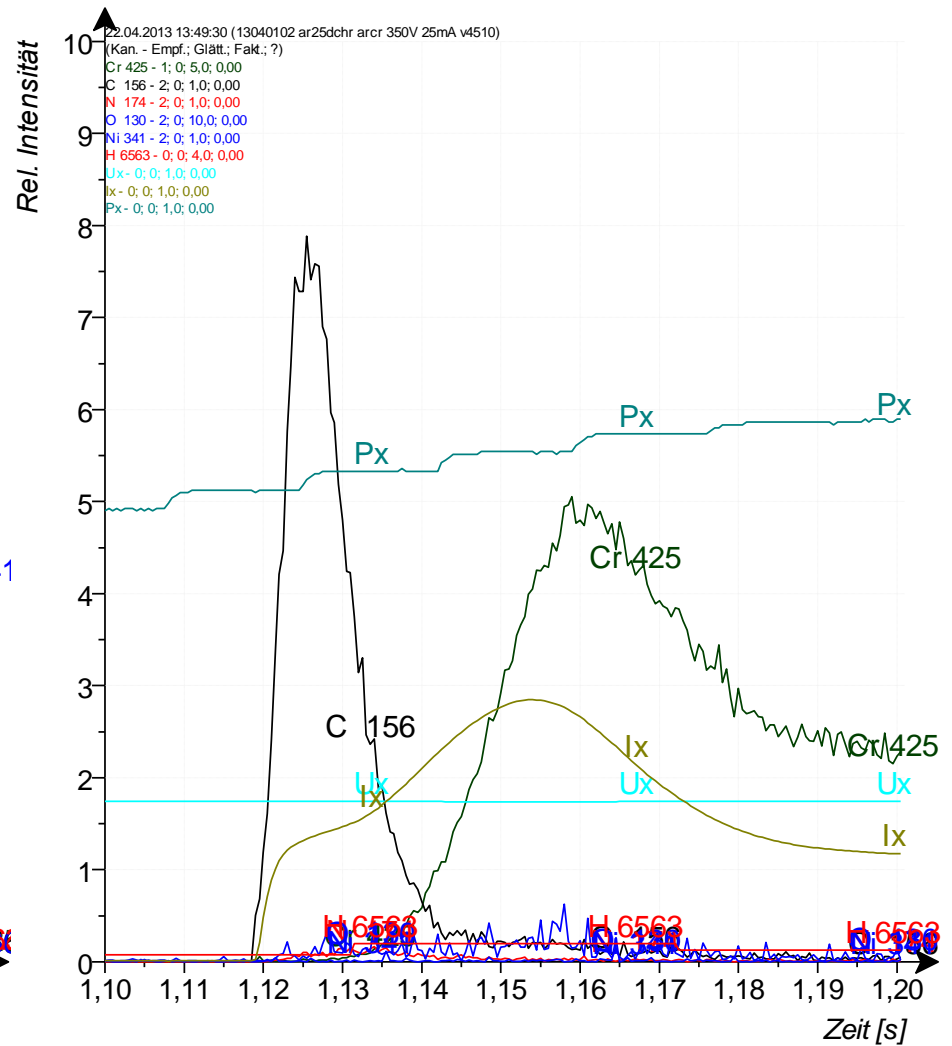
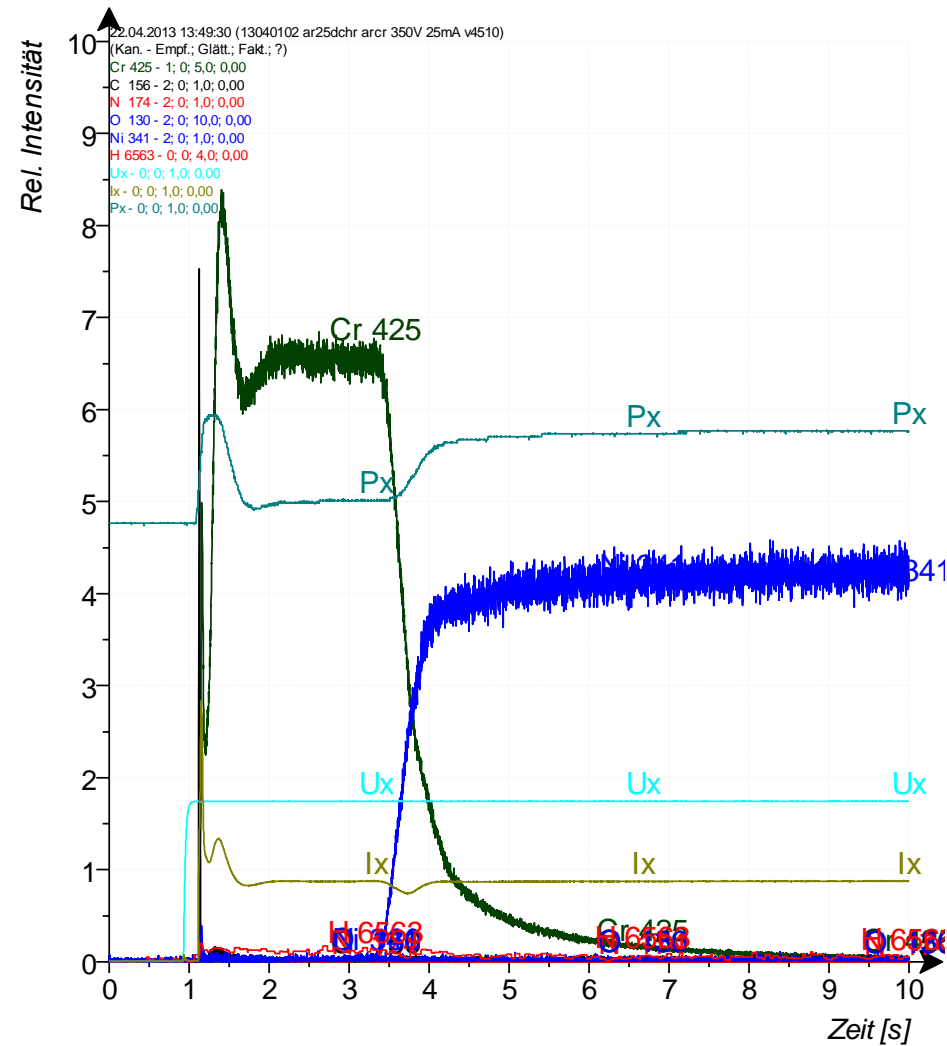


## Intensität von Cr und Ni über Zerstäubungsarbeit

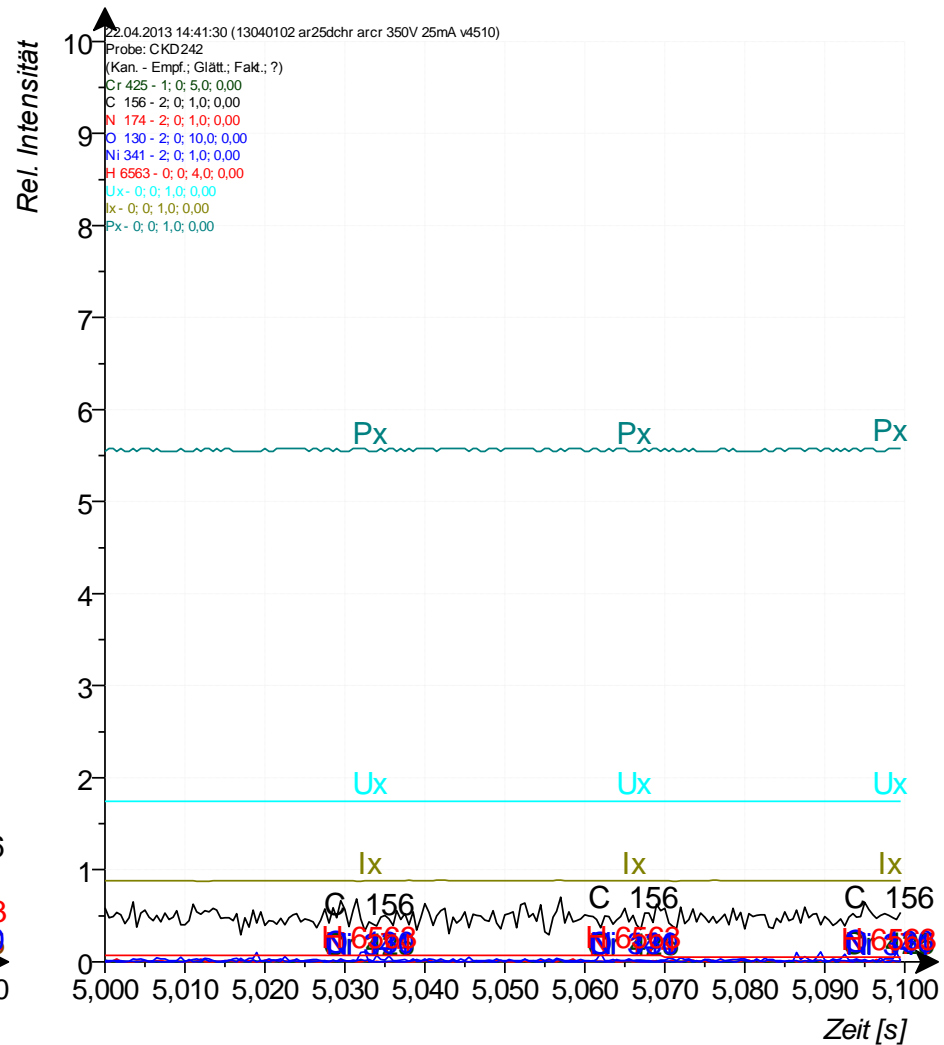
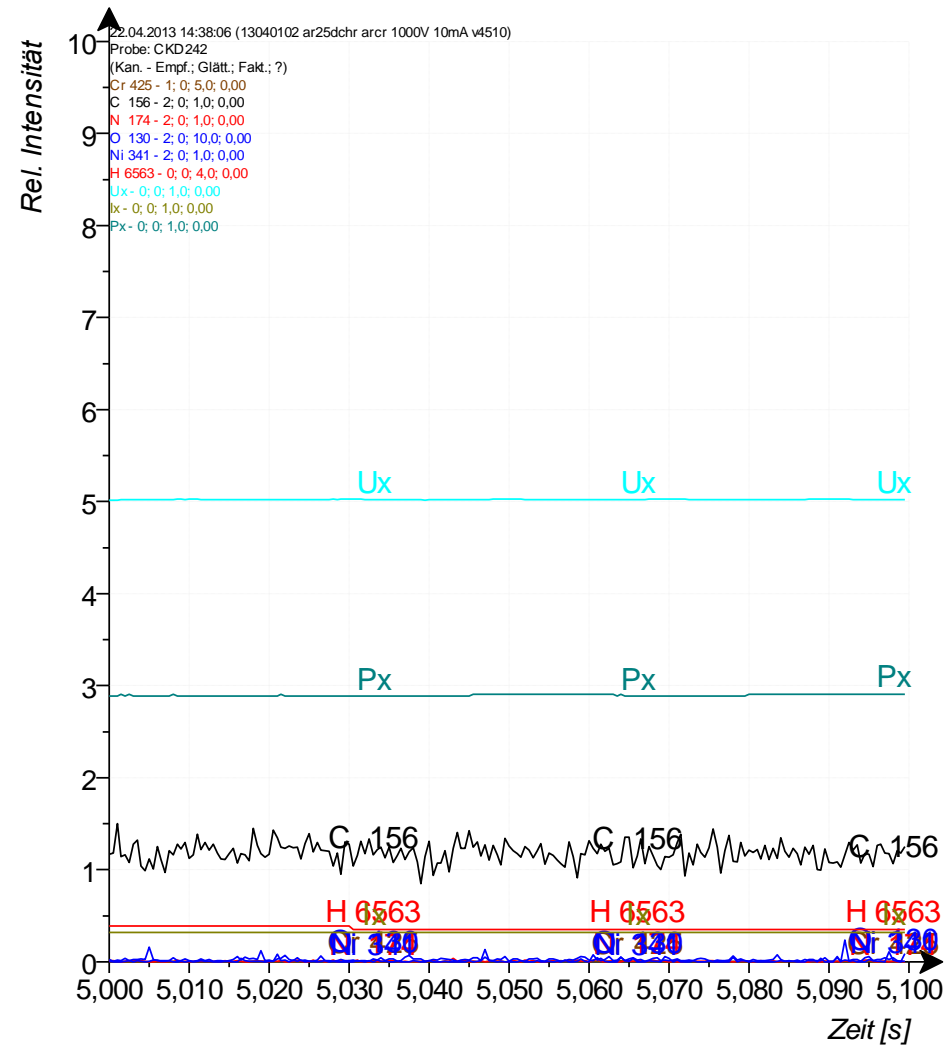






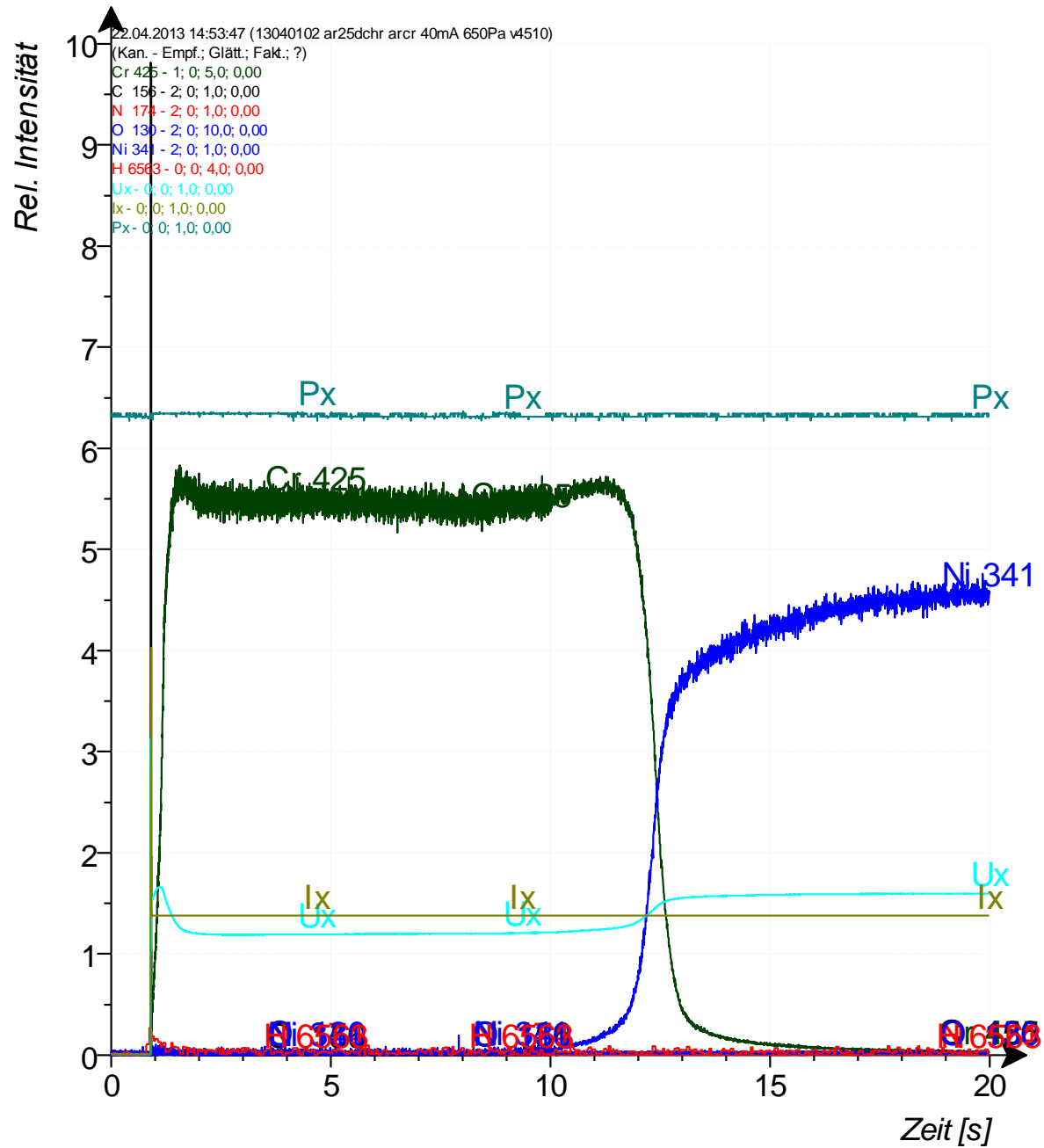


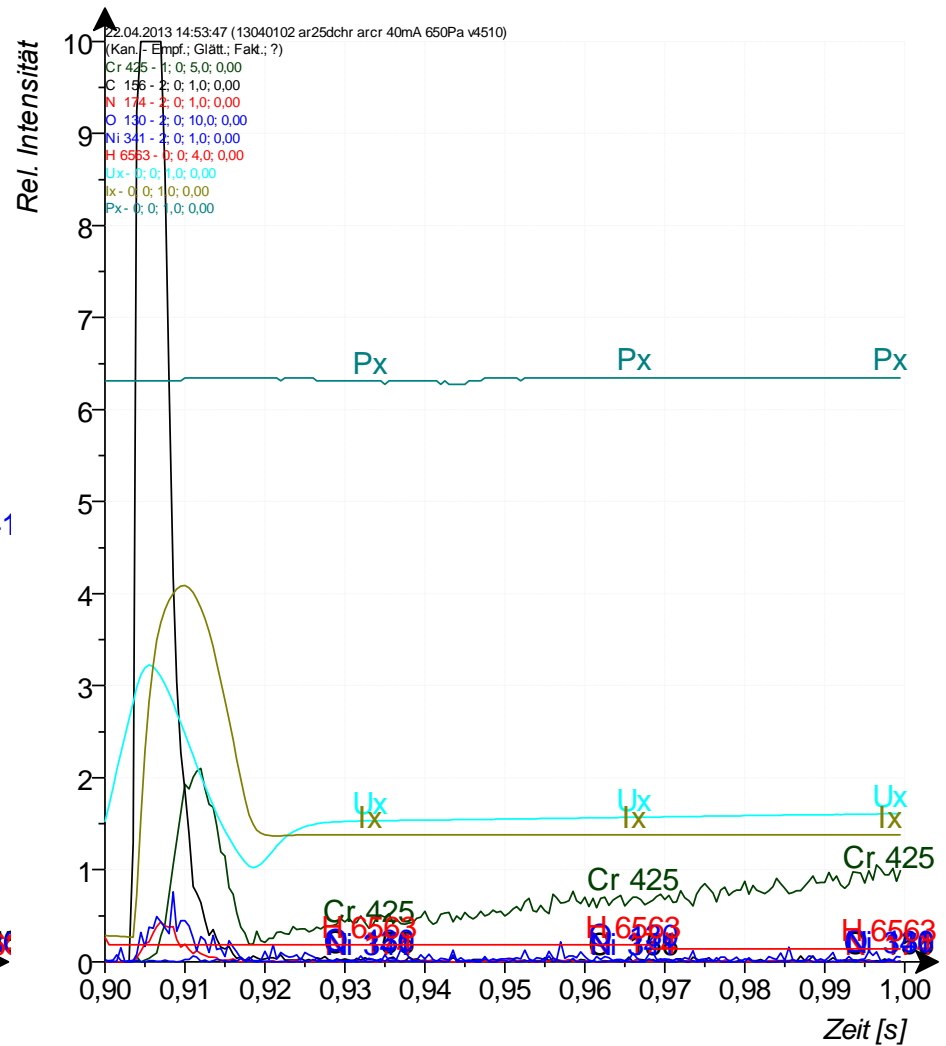
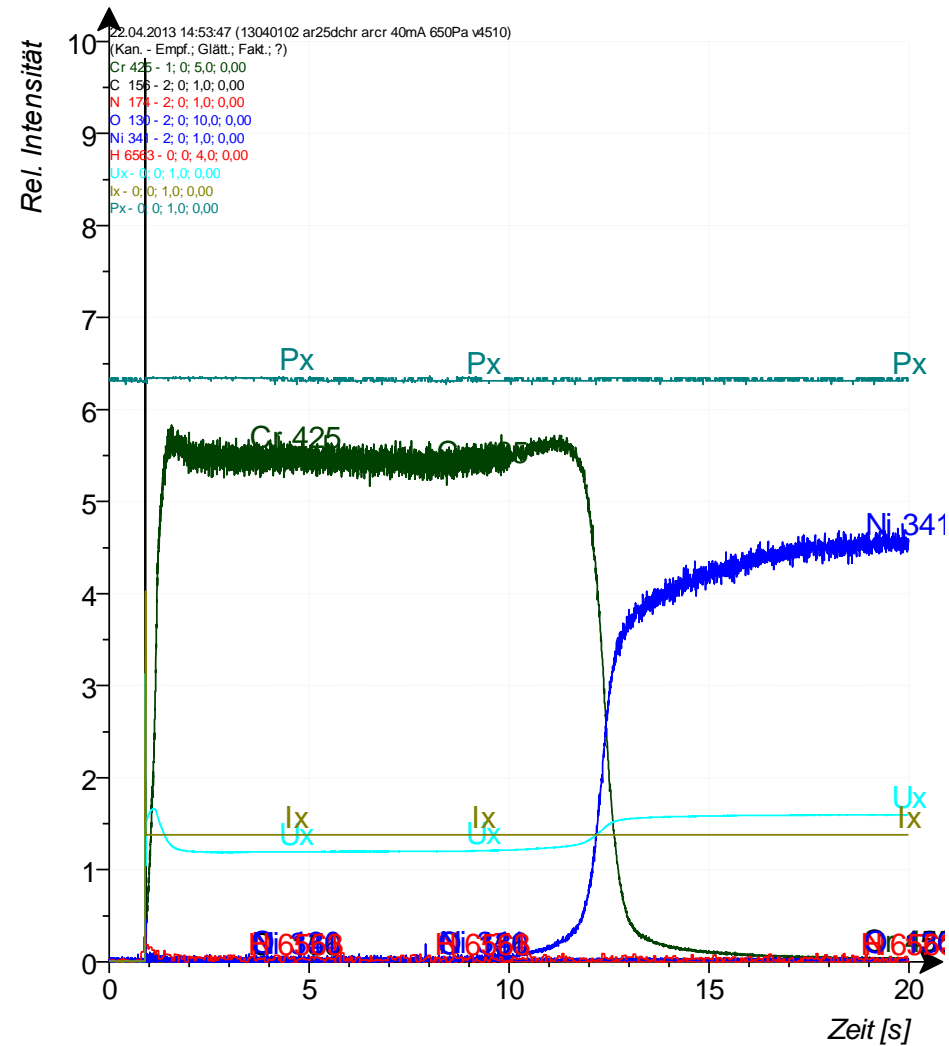
Chromschicht mit ~200 nm Dicke, gemessen mit geringer Spannung



Gusseisen Referenz CKD242, gemessen mit beiden Bedingungen







Chromschicht mit ~200 nm Dicke, gemessen mit geringster Spannung

## Physikalische Parameter eines Plasmas zur Dünnschichtanalyse im Vergleich...

Anodendurchmesser:	2.5 mm	2.5 mm
Spannung:	<b>200 - 400 V</b>	600 - 1200 V
Strom:	<b>20 – 80 mA</b>	5 - 20mA
Druck:	<b>5 - 7 hPa</b>	2 - 4 hPa
Weitere Werte:		
PMT-Mode:	1-2 (niedrige Spannung)	2-3 (hohe Sp.)
Erosionsrate:	<b>10 nm/s</b>	100 nm/s
Anodenabstand:	0,15 mm	0,15 mm

**DANKE FÜR IHRE  
AUFMERKSAMKEIT!**